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# Lectures & Examinations

BEING

Hints on Taking Notes at Lectures

WITH SOME

Suggestions on Preparing for Examinations

H. S. MORTON

(Late Scholar of Corpus Christi College, Cambridge)



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## PREFACE.

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These pages are the outcome of a suggestion which was made to me that I should expand some notes which I had originally drawn up for the use of private pupils, and that I should put them together in the form of a small book.

If the hints it contains are found to be of any help to members of Universities and others attending lectures and working for important examinations, the book will have served its purpose.

My best thanks are due to Professor T. B. Wood and Mr. G. G. Butler for valuable criticism.

H. S. MORTON.

CAUSEWAY HOUSE,  
CAMBRIDGE.

*September, 1913.*



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## PART I. ON TAKING NOTES AT LECTURES.

### I. INTRODUCTION.

Those who go to lectures may be divided for our purpose into three classes, according to the type of memory they possess:—

- (1) Those whose method of recording what they hear is by the absorption of the information into their brains, the making of mental notes, and the shelving of them, so to speak, in their mental library. This may, perhaps, be called an “intellectual” memory.
- (2) Those who have the uncommon gift (a gift often coupled with a defect in one of the other senses) of being able to remember practically word for word what the lecturer says, producing, as it were, a gramophone record in their brains, which they are able to “turn on” at any time when needed. An “aural” or “auditory” memory.
- (3) Those who try to imagine the information given as a picture or diagram, photographing, so to speak, all they hear said, developing and fixing it either at once or later, and putting the mental photograph away in its allotted album in the brain. A “visual” memory.

May we give a simple illustration to compare these three types? Suppose, for sake of example, the Battle of Waterloo is being described.

The listener with the first type of memory would be able to take in the general plan of campaign, the

different tactics, the time of day at which the various advances and repulses were made, Wellington's encouraging words, the fine flanking movement of such and such a regiment, and so on, by writing it down (with modifications and omissions) in his mental note-book, and placing the book in its right place in the mental library, from which it can be taken out when it is a question of remembering.

The second type, in listening to the description of the battle, would merely start the machinery going, stop it when the lecturer had finished, and put away the gramophone record in its right box in the brain, to be called for and "switched on" when necessary. This type of man would commonly be likened to a parrot; but perfect "parrots" are very rare, and the type of memory when imperfect is very dangerous.

The listener with the third type of memory would imagine the whole battle as a picture, or rather a series of pictures, making diagrams in his brain to illustrate the formation of the troops and so on; the method of committing to memory being the pasting, so to speak, of the series of photographs into the mental album. He would probably never be able to remember the various periods of the day at which the advances and retreats were made, or Wellington's words, just because no picture could be visualised to represent them.

It may be observed in passing that Type No. 1 is often a bad speller, no exact record being kept of words seen in print; Type No. 2 an indifferent speller, having only the sound of the words to go by; while Type No. 3 seldom spells a word wrongly, any word once seen written being mentally photographed and so recorded accurately; but, if given to spell a word which he has never seen written, he is nonplussed. The three types converge together, of course, and it is very often difficult to distinguish clearly between them.

It is mostly for the third type that these hints are meant, partly because the possessor of a really good general memory \* (the less parrot-like the better) will not need to take either so many or so special a form of notes, and partly because the method of diagrams, which will be explained later, will probably not appeal to him.

## II. LECTURES AND THE TAKING OF NOTES.

The great value of attending lectures is derived not so much from what the lecturer says as from the way in which he says it. How often does one have to read and re-read a sentence in a text-book before one grasps on which word the emphasis is meant to be and what the author is "driving at." (It is often a good plan to underline the important word for a future reminder.) This trouble is saved when listening to a good lecturer who varies his tone to suit the meaning and lays emphasis on the important word.

A good set of notes taken from a good lecturer makes the most valuable basis from which to work up a subject that the student can have. The great advantage lies in having all arguments and processes of reasoning in one's own method of thinking, and everything set out by oneself in a form which one is best able to understand, and from which one can recall all points in the lecture.

Undergraduates are often heard to say: "I am no good at taking notes; I 'keep' all my lectures, but make the text-book my working basis."

\* A good memory may be said to depend upon:—

- (1) One's ordinary natural tenacity, which is a gift, and *cannot* be improved by education.
- (2) One's habitual methods of recording facts, including the art of weaving round the fact to be remembered as many associates as possible, which *can* be improved.

By the "possessor of a . . . . good . . . . memory" is meant here the man with a high natural tenacity.

It will be found that these men are not deriving nearly as much good as they ought, simply because they have not acquired the habit of taking down full and well arranged notes. Besides being an interesting study in itself, the actual taking of the notes makes the subject more interesting, and helps one to keep one's mind rivetted on what the lecturer is saying. Of course a great deal depends on the subject of the lecture; but the subjects for which it is unnecessary to take notes are very few.

Again, the reminding power of one's notes is important, for to the strings of fact are attached trains of argument by which one is able to recall the method which the lecturer used in arriving at the fact, and even the lecturer's expression and tone of voice at the time: we must bear in mind that the best and often only way of committing anything to memory is to gather round it as many associations as possible.

There are a great many who advocate making a fair copy of one's notes as a means of remembering them, but the writer ventures to disagree with this for the following reasons:—

- (1) Writing out is tedious, and is very apt to make one's mind wander; and if one copies without paying attention, it is merely a waste of time.
- (2) If plenty of space is left between the lines and the opposite side left blank when taking the notes, all additions, expansions and alterations can be inserted at any later time; and although this tends to make the notes untidy, the very irregularities help to impress upon the memory all the details of the lecture.
- (3) The reminding value of one's notes, mentioned above, is greatly diminished by making a fair copy.

### III. FACT AND REASONING.

If the subject matter of any lecture comes to be analysed, it is generally found that it can be divided into:—

- (1) Bare facts.
- (2) Logical arguments.

Naturally one subject contains much more of one than the other. For instance, Logic consists, of course, almost entirely of reasoning. For examples of subjects which have a preponderance of fact, we might cite—Archaeology, Elementary Geography, Palaeontology, and, perhaps, History and parts of Jurisprudence, while Philosophy, Mathematics (especially Geometry and the Calculus), Physiology, Physics and Genetics might be said to have a preponderance of reasoning.

To make notes of fact is generally an easy matter, as long as there is time to take down as much as is wanted, but reasoning must be followed and clearly understood before notes can be made.

The man with the photographic type of memory has to be a quick writer when the lecturer is providing mere fact of which a picture cannot be made.

But it is important to bear in mind that many facts which are stated in the lecture hang upon a reasoned argument which is apparent if sought after: and to append a little note of this reasoned argument, in brackets, is an extremely valuable help in remembering the fact. It cannot be too often repeated that the way to commit any fact to memory is to collect round it many associations, from which there are easy paths leading to the fact; and the chance of remembering at a future time will depend upon the number and persistence of these associations and paths.

Let us take an every-day example:—Suppose we want to remember to keep an important appointment. Most of us would write it down in our engagement book, to which we know we shall refer each day; some



of us might keep the letter about the appointment in our pockets; some of us might make a knot in our handkerchiefs; some of us might think that as it is important it is sure to be uppermost in our minds, and as we shall always be thinking about it we cannot forget.

Now by all of these practices, the hope of remembering is based on:—

- (1) The constant deepening of the impression on the memory by being incessantly reminded about the appointment,
- (2) The cutting down of the period through which it has to be kept in the front of the mind to the last few hours beforehand,

but is it not possible that the appointment may be forgotten at the last minute?

The wise man (although he may employ one of the above methods as an extra precaution) will make the following his main method of remembering:—He will begin to plan out how the appointment will affect his usual routine, and will say to himself something of this sort: “As he wants me to meet him at that time, it means that I shall have to start a little earlier than usual, so I must go and order breakfast at 7.45, and tell the housekeeper to call me early; and as I shall have to take a great number of heavy books to show him I shall not be able to bicycle as I usually do, so I need not mend the puncture in my tyre till after the appointment, when I shall have more time; that will mean I must catch the 8.30 bus; I hope it is not crowded as it often is,” and so on, thinking it out and forming round the fact to be remembered many associations and paths, one of which he is sure to strike upon before the time of the appointment. His housekeeper may possibly forget her orders, the sight of a crowded bus the night before and using the books he has to take with him may both fail to remind him, but when it comes to getting his bicycle ready, the

flat tyre is sure to make him remember, probably bringing out the familiar phrase, "That reminds me."

It was owing to the presence of many associations with paths leading from them to the fact, and to his *reasoning* that he remembered the *fact* that he had to keep the appointment.

The same applies to any subject we may take up. In History, for instance, the best and much the most intellectual way of committing to memory a pure fact like the date of a king's accession to the throne is to work out the relation between it and the years of rule of the last sovereign, the date of a battle, the death of a statesman, the length of life of a Parliament, a change of dynasty, and so on, interweaving them all together \* so that one can have some reasons for stating a certain date, and need not depend entirely upon a rhyme or other parrot-like method of remembering.

The failure to remember a fact in an examination is very often due to the lack of previous reasoning, of some link which can bring out from us the expression, "That reminds me."

#### IV. SYSTEM.

Notes without any system are practically useless.

One quite often comes across a man whose notes are a perfect muddle from beginning to end. That man will generally admit his notes are quite valueless to him.

The more business-like a man is in his method of taking notes, the more use will his notes be to him after, and the firmer will become his grasp of the subject.

With regard to the question of whether to use a notebook or one of the various filing arrangements, it is largely a matter of individual taste. If the course of lectures at which one intends to take notes is a definite

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\* It is an assistance to the memory to settle upon the dates of a few important events to use as bases, basic dates we might call them, from which others in the same period can be imagined to radiate.

one, embracing an entire subject, an ordinary note-book is the best; lined, if the subject be nearly all writing, such as History, Theology, or Jurisprudence; unlined, if there are to be many figures and diagrams, or if the spacing of the words has to be uneven, such as in Mathematics.

It is a help to use note-books with different coloured bindings and to allot a certain colour to each of one's subjects, and to keep to the colour when getting further note-books for the subject.

It is a mistake to get a small note-book for any of the subjects or main divisions of a subject of one's study. It may be taken as an axiom that one's notes for the term *will* fill a large note-book.

A file of some sort is useful under the following circumstances:—

- (1) If it should be possible only to attend a course on certain days owing to its clashing with another course, then single sheets of paper, lined or unlined, whichever is the more suitable, can be used at these lectures, and the notes on the lectures missed can be written out either by borrowing notes from someone else or by studying the text-books on the subject, and the sheets can then be arranged properly and in order in the file. (This is not a satisfactory arrangement, but sometimes unavoidable.)
- (2) If four lectures have to be attended consecutively in the morning, some men object to carrying about a great many note-books with them. In this case one general file stocked with single sheets of paper can be taken to the lectures and notes taken on these sheets, beginning a fresh sheet, of course, for each lecture. Then in the evening the sheets can be sorted out, read through (altering and expanding where necessary), and added to the previous ones in their respective special files. The objection to



this system is that one cannot refer to one's back notes during the lecture if one wants to.

- (3) If one wishes to add a great deal of matter to various parts of one's notes at some later time, or where one likes to rewrite parts or redraw the figures and diagrams, one is able to replace and add sheets as one likes if a file is used.

For those who are fond of them, there are a large number of files and labour-saving appliances which can be chosen from at any good stationer.

An objection to files in general is that the sheets of paper are liable to become loose and get lost, but a little care will obviate this.

Summing up, the writer is inclined to think that an ordinary note-book cannot be beaten, if one side is left blank for additions, criticisms, side issues and extra sketches, and a list of contents is written on the front page, and the subject (and section, if more than one note-book has to be used for the subject) is marked on the side and on the back, so that, whether on the table or in the bookcase, there is no difficulty in picking out the note-book one wants from among the rest.

If once the student recognizes the importance of method and of working out special schemes of his own, note-taking will be an easy matter for him and his notes will be of real use to him.

Some subjects obviously need classification more than others, but it is possible to draw out some system of classification for nearly every subject.

Let us just consider a few different systems of classification :—

In HISTORY one would, of course, have a note-book for each set of lectures. The main divisions of each would probably represent periods, and the periods might be subdivided into various types of headings, such as :—  
 “Collapse of Constitutional Authority,” “Montezuma's great work for his Kingdom,” “The later years of

Charlemagne," "Powerful weapons of the Church," etc. Although real classification is impossible, it will be found that the more headings into which the subject can be divided the more valuable will be the notes. It might be said here that it is often difficult to realize what the lecturer is about to discuss, so that the headings must sometimes be inserted after; but all good lecturers give a clue as to what they propose to deal with next.

When taking notes at History lectures it is a good plan to put important dates down in the margin alongside the description, both as a help in remembering them and for the purposes of future reference.

SCIENCE is the best example of the value of systematic classification. In most of its numerous branches it is absolutely essential. Take, for example, Palaeontology: the greater part of the subject is the classification of the fossils: an extract from a note-book with plenty of system in it might be as follows:—

Phylum	F.	Arthropoda,
Class	II.	Crustacea,
Sub-class	b.	Malacostraca,
Order	viii.	Decapoda,
Section	$\beta$ .	Brachyura,
Genus	3.	Xanthopsis,

and here would follow the description of the genus, and the names, characteristics and stratigraphical positions of the various species.

Pure classification is similarly an important part of Botany, Zoology, etc., whilst in Physics and Chemistry the subject *must* be dealt with under various headings and sub-headings.

Subjects like JURISPRUDENCE, ECONOMICS and THEOLOGY do not at first sight seem to lend themselves to division, but some heading can always be found for

every portion of one's notes. Take a simple example in Law:—

### THE CONTRACT (*continued*).

#### ESSENTIALS FOR VALIDITY.

- (1) Offer and Acceptance.
- (2) Form or consideration.
- (3) Persons capable of contracting.
- (4) Genuineness of assent.
- (5) Legality of objects.

or again:—

### EASEMENTS.

#### (A) LIGHT.

- (1) Acquisition of Right of Light.

By (a) Express Grant.

(b) Implied Grant.

(c) Prescription at Common Law.

(d) Prescription under Prescription Act.

- (2) Extent of the Right of Light.

- (3) Extent of the User of Light.

- (4) Extinction of Rights.

and so on,

writing notes on the necessary points under each heading.

The value of method is not so important in either Classics or Mathematics, though headings will always be found useful both for the taking of notes and for subsequent revision.

## V. ABBREVIATION.

A reason often given for inability to take good notes at a certain course of lectures is that the Lecturer "goes so fast." This difficulty may be got over in one or all of three ways:—

- (1) Learn shorthand.

- (2) Cultivate the art of writing notes on what the Lecturer has just said while simultaneously paying attention to the subject to which the Lecturer has passed.

(3) Invent a system of abbreviation of your own.

As to (1), it is hardly worth learning shorthand if it will be of no use to you afterwards.

As to (2), this is what (very roughly) may be said to happen:—One part of the brain, through the agency of the hearing organs and afferent nerves, receives the Lecturer's words which are passed on to a department where the meaning gets "understood." Another department decides what notes to put down, and it is somewhere between here and the nerve centre which controls the movements of the hand (by means of the efferent or motor nerves) that storage and gradual supply must take place, while the receiving and reasoning departments are dealing with the next item of the lecture. Although this storage and gradual supply may come naturally to some people, it is usually only by practice that the faculty is acquired. (A certain amount of practice is obtained in letter-writing, if one tries to make a point of not hesitating at all between one sentence and the next.)

As to (3), if it is impossible to write fast enough to make as full notes as one would like, it is a good plan to abbreviate one's words freely. For instance, "wd," "cd" and "shd" can stand for would, could and should; "l" for the; "-" for of; "&" for and; "v" for very; "v" for extremely; "wh" for which; "+ve" & "-ve" for positive and negative, etc.: also unnecessary words can be dropped out here and there (but this must be done with care, for the omission of, say, the word "the" may, under certain conditions, spoil the meaning); the first letter of the name can be substituted for a name which is being constantly mentioned, and so on. But no rules can be laid down as to how various words can be abbreviated; it is much better for everyone to make up their own system, creating a kind of private code: although this renders notes useless for lending to anyone else, it is very valuable for saving time.

Wherever the cause and result (or "premises and

conclusion," as they are called in Logic) follow each other, they should be separated by the insertion of the "therefore" sign ( $\therefore$ ), otherwise the cause and result may be confused on looking through the notes later. This is, of course, extremely important in Mathematics, but is applicable to a great many other subjects. Similarly the "because" sign ( $\because$ ) is useful when a reason for a fact follows immediately after the statement of the fact.

Of course the use of letters, figures, symbols, formulae, equations, etc., helps the abbreviation process enormously.

It is, perhaps, a small point, but the writer considers that a *good* fountain pen has many advantages over an ordinary pen, both at lectures and in examinations, and that, by always using one, more time is saved than one would think.

## VI. THE VALUE OF DIAGRAMS.

The possessor of a "photograph memory" of the extreme type is always, so to speak, carrying his camera about with him, and is never happy unless he can obtain a pictorial impression of everything that reaches his ears. This man ought to have his note-book full of diagrams. The extreme type is not often met with; but all who have any tendency to pictorial impression will find diagrammatic representation a great help for the following reasons:—

- (1) It is a saving of time.
- (2) The actual making of the diagram in one's notes often helps one to work out the lecturer's reasoning at the time.
- (3) On looking up one's notes at any future time, the diagram reminds one *how* one understood what the lecturer was saying, and the method of reasoning which he employed.

Of course some subjects, such as Botany, lend themselves much more to this kind of representation



than others, but it is surprising how much can be put in the form of a diagram. The simplest example is the substitution of an arrow (thus  $\longrightarrow$ ) for such phrases as "turns into," "goes towards," "attacks," "is the means of producing," "and the result is," etc.

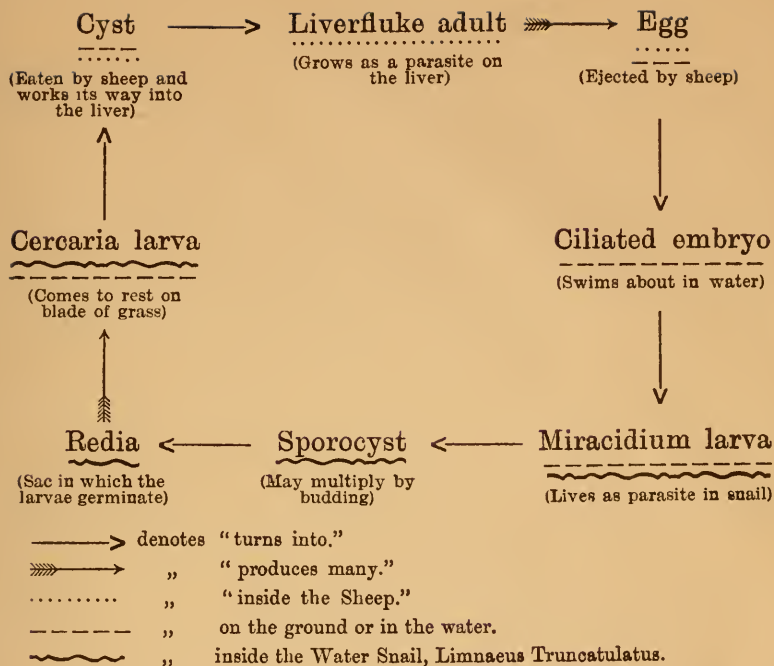
In Science, illustrations of apparatus, botanical, geological, or anatomical specimens, structures, organs, and so forth, properly labelled with the names of the component parts, are quite essential, and generally a much better means of description than a long rigmarole of words; but it is more the diagrammatic representation of the *abstract* that is here referred to.

In all branches of Mathematics one gets an allied form of representation, and it is mostly to the mathematical brain that this method of diagrams will appeal. But it is not only applicable to Science and Mathematics. Everyone knows how much clearer the succession of the English Sovereigns becomes when a long description of the various complicated connexions between the royal personages is converted into a neat genealogical table, and how much time and space is saved.

The description of a battle, the constitution and organization of a community, the relation between points in the policy of a statesman, the breaking off of new and the extinction or the merging together of old religious sects, and so on, can all be represented by diagrams of some sort if a little originality is displayed.

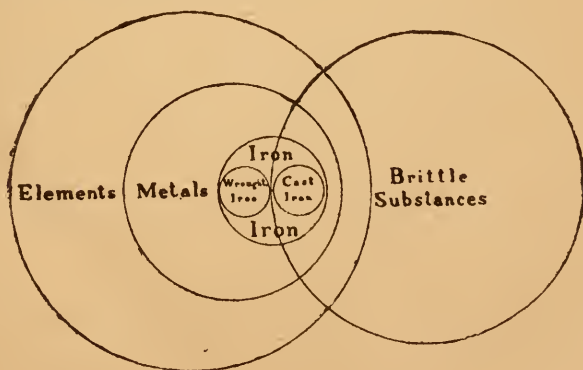
It will be useless to give many examples, as it is from the making up of one's own system of diagrams that one benefits most; but it seems imperative to supply one illustration of what has been said above:—

The whole life history of the Trematode worm, the common Liverfluke (*Fasciola hepatica*), the great enemy of the shepherd, may be represented by a single diagram such as this:—



This section ought not to be concluded without introducing the name of the celebrated mathematician Euler, who was the first to use the diagram method of representing Universal and Particular Affirmatives and Negatives by arrangements of circles.

By one such diagram as:—



we immediately infer, amongst various negative conclusions, that:—

- (1) All metals\* are elements.
- (2) Some elements, including some metals, are brittle substances.
- (3) Iron is a metal.
- (4) Cast iron is a brittle substance.
- (5) Wrought iron is not a brittle substance.

A great deal of writing can often be saved in this way, and there is no doubt about it serving to impress the facts and processes of argument upon the memory. However, the range of subjects to which this method can be applied is not large.

## VII. A SUMMARY OF HINTS.

A summary of the foregoing pages makes a set of rules which, the writer ventures to think, those who have not had much experience in taking notes at lectures will find useful:—

- (1) Keep your mind fixed on the Lecturer's train of thought, and so try to understand his reasoning throughout.
- (2) Always be quick to catch the reason for everything he says.
- (3) Be methodical in the arrangement of your notes.
- (4) Get down in your note-book as much as possible, inventing all your own abbreviations where such are necessary, and making use of explanatory diagrams, well labelled.
- (5) Underline the word on which you wish emphasis to be laid.
- (6) Let your phraseology be your own as far as possible: that is to say: Do not write down sentences from the Lecturer's lips. But if you

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\* The word "metals" is used here in a strict chemical sense, and is not meant to include alloys.



fail to understand one of his arguments, then the only course is to write down the words verbatim, and to get the argument cleared up later (as soon as possible) by asking the Lecturer or your coach or supervisor, or by referring to text-books, and inserting the point or points which have helped you to understand the argument on the blank page of your notebook opposite the matter which has been written verbatim. It is almost useless to try to make out the argument by yourself by poring over the dead form in your note-book, when you have failed to understand it at the time when the Lecturer is varying his tone and laying emphasis on important words.

- (7) Make a habit of reading through carefully in the evening all the notes taken in the day, altering and expanding where necessary. [This is extremely important.]

## PART II. ON PREPARING FOR EXAMINATIONS.

A few little notes might possibly prove useful to those intending to enter for an important examination.

Examinations are supposed to be tests of the candidate's knowledge, though they are very often a test of his ability to "cram," or of his quickness of thought and the speed at which he can write. A good examiner, however, can usually detect the crammer by his superficial knowledge, and his inability to answer indirect questions, which arises from committing to the memory just before the examination facts with which he has woven very few associations; and can readily distinguish him from the candidate with a thorough and sound knowledge of his subject.

To acquire that thorough knowledge, plenty of time *must* be given, however efficient our brains may be: so it is well to start preparing as far from the date of the examination as possible. It will always be found that the longer one spends acquiring certain knowledge, and the more associations there are collected round, the firmer will that knowledge get rooted in the memory. (A good example of this is the classics of one's preparatory school days.)

Besides this thorough knowledge there are two other important factors which go towards gaining a high place on the list ("success," as it is called), which must not be lost sight of. One is experience in, and the other a study of the art of, taking examinations; it is very essential that the candidate should work out some special system of preparation to suit his particular case.

Now let us suppose that all lectures in each course have been kept, good and well-arranged notes have been taken, and read through every night, that we have studied

the papers set for the last two or three years, so as to get familiar with the type of question the examiners ask, and that a vacation and a term separate us from the examination.

Now systematic and thorough revision two or three times over is absolutely essential before an important examination; the longer one can spend on revision without any new matter to be learnt, the better.

Suppose we have no more lectures to take, so that a clear ten weeks lies before us for revision. We have already made little marginal notes in our note-books by referring to the text-books or to our supervisor, expanded certain little details and systematised the whole, so that we may consider that if we know our note-books we know our subject fairly well. We have seven chief subjects, but know two of them much better than the rest. We will spend the first week on these two, and then give the next five weeks for our other five subjects consecutively, revising the one we think is most difficult to remember the last. We then have four weeks before the examination: three of these weeks we spend on our second and final revisions, planning out our time in the most suitable way; during which period we do many papers (similar to those we are likely to have in the examination) which we may make up ourselves or which our coach or supervisor may set for us, getting them finished in a specified time, for it is very essential to have as much practice as possible at working against time before we take the examination. We are then quite prepared to take the examination a week before the time.

Stress might here be laid upon the importance of going to bed early during the last fortnight, of taking plenty of exercise so as to keep fit, and of getting into the way of being at our best at nine o'clock in the morning. It will be upsetting if we suddenly have to change our habit on the day of the examination.

The last week finds us at the seaside or at some place where our thoughts can easily be detracted from examinations, and where the brain can have a perfect rest.

Now there are divergences of opinion with regard to this complete holiday immediately preceding the examination.

On the one hand, many say it is of no advantage to do any work, not even to glance at one's notes, for a clear week up to the time of walking into the examination room.

On the other hand, there are many who, while advising a rest at some period before the examination, advocate spending the last few days on final revision. There are few who do not acknowledge the value of a rest at one time or another.

The writer considers that the choice depends upon :—

(1) The type of subject. The greater the preponderance of fact over reasoning the more valuable is final revision at the last moment ;

and (2) The type of candidate. If he (a) has a bad memory, (b) is methodical and has prepared a very condensed summary of his notes, and (c) is not likely to be flurried or muddled by revising at the last moment, it will probably benefit him to take his rest early, and work up to the last minute, but not otherwise.

To take an average type of candidate, the following procedure may, perhaps, be found to " pay " best :—

Suppose it is Wednesday. We have finished our third revision and have made on a few sheets of paper some very condensed notes, perhaps merely a collection of single words, just to remind us of the parts of our notes which we find hard to commit to memory, and for the purpose of setting our train of thought working.

The examination starts next Wednesday. We will get away from the sphere of work and academic associations and take a complete rest for three or four days at the

seaside or home, or some place with an entirely different environment; not taking any books with us, for if we do we shall find it very hard not to be always at them. On Monday morning we are back again, and we spend the rest of the time on just refreshing the memory by running through our condensed notes, not under any circumstances attempting to learn anything new to us; not working too hard, and going to bed early.

On the day itself we get up a little early, run over once more quite leisurely our condensed notes just to get our train of thought working, and, being cool and collected, stroll to the examination room, arriving in good time.

A few hints on the actual examination, though some are rather obvious, might perhaps not be out of place:—

- (1) Before you begin, apportion your time for each question, either in equal proportions or in such ratios as you think best; and keep to these times as far as possible.
- (2) Spend a little time studying the exact meaning of the question before you begin to answer it, in order to make out precisely what the Examiner wants. It so often happens that the candidate misreads the question from not thinking over it enough; and, though his answer may be quite sound, the Examiner cannot give any marks for it, as it is not an answer to his question; or only a few marks, because of its irrelevancy. Sometimes, when halfway through his answer, the candidate may suddenly realise that he has misunderstood the question; and has to begin afresh or modify his answer considerably; which might have been saved by thinking over the meaning of the question well, before answering it.
- (3) It is generally best to start on those questions which you can answer most satisfactorily and



to leave the ones you do not like the look of till the last; but where there are problems which may take you some time, or long descriptive questions, it is often wiser to leave these to the last so that they cannot take up too much of your time and compel you to rush the others.

- (4) If the subject be an essay, or if the question be one starting with the word "discuss," or any one which calls for initiative or originality in answering, spend some time (half-an-hour or more in the case of a three-hour essay), in making out the one point round which you can see the Examiner wishes you to centre your arguments, working out your scheme by building up a diagram similar to a genealogical tree in history, and arranging your treatment under headings, after which you will find the actual answering of the question come much easier and be in a form which the Examiner will appreciate.
- (5) If you find you are taking much too long over a question, end it off quickly and begin the next. It may be disappointing not to be able to complete your answer, but you must be severe with yourself in examinations.
- (6) It is much more important to attempt all questions than to spend the time trying to perfect a few of them, for it is easy to obtain three or four marks out of ten for a question you are uncertain about, while it is unlikely you will add more than one or two marks attempting to perfect your answer to a question you like.
- (7) In some subjects, especially in scientific ones, it is important to set out your answers systematically with headings so that the Examiner can see at a glance how you have divided up your

treatment of the subject, and knows from the heading what to be prepared for.

- (8) Try to make the most of the knowledge you possess, but not so far as to cause the examiner to call your answer irrelevant.
- (9) Use coloured pencils freely for making sketches and diagrams clear. They are an enormous help both to you and to the Examiner.
- (10) If time is precious, do not waste too much on making careful drawings or artistic sketches, where clear diagrams will answer the purpose, and if time is getting very short, label the diagrams only, without any long explanations.
- (11) Leave enough time at the end for looking carefully through your paper, putting in stops and making all necessary corrections. This is more essential in essays and literary subjects than in others.
- (12) Never discuss between the papers what you got wrong or right with fellow candidates, for you are more likely to be disappointed than encouraged, and every minute is precious for either taking a rest or preparing for the next examination, and there will be plenty of time for discussion after the whole examination is over.
- (13) Do not do much work in the evenings between the papers, and make a point of going to bed early; it is the saying of a well-known coach that every minute after 10 o'clock means a mark lost in the examination next day.

## APPENDIX.

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### SOME HINTS ON PRACTICAL EXAMINATIONS IN SCIENCE.

As undeserved failures in Science examinations are so often due to "coming down" in the practical work, a few general hints on this subject, which are not included in the foregoing pages, may be found helpful.

We are not going to concern ourselves here with laboratory work throughout the year, as it differs so much in the various subjects, but it may be mentioned that too much stress cannot be laid upon the importance of getting in as much practical work as possible, so as to get quite familiar with all the small details of each type of experiment, or, in the case of biological subjects, to practise cutting sections, dissecting tissues, using the microscope, drawing sketches of specimens, and so on. We will assume, however, that the candidate is in a position to do well in the examination, if he goes about it in the right way.

Although it is really only experience in practical examinations themselves that will enable candidates to do them properly, the following pieces of advice, if taken, may go towards gaining high marks :—

- (1) In Chemistry and other subjects where it applies, start first on the experiment which will take the longest but will require least attention, such as where a liquid has to be heated up to boiling point; and have two experiments going on at the same time where practicable.



- (2) Get down on paper as much as you can about the work you are doing. This is the commonest reason for a candidate not gaining the marks he should do in practical work. Have a slip of paper by you on the bench, and note down any details which you think will be worth referring to when you come to write out your answer; and when you have finished the practical part of your question, sit down and draw up a clear and concise answer.

If it is an experiment in Chemistry or Physics, first give briefly the method you have adopted, then the practical details with sketches, the possibility of errors, the degree of accuracy you can hope for, and so on, and then your calculations (if any), and your result, and any further comments; all depending, of course, on the type of experiment.

If the subject is a Biological one, you should be careful to include all the practical details as to how you dissected the tissues or cut the sections and mounted them, and, in cases of identification, *all* your observations and *all* the reasons for your deductions, and so on.

Do not count on the examiner having noticed the apparatus you have set up and the method you have employed, or the way you have cut and mounted a section or dissected some Biological specimen, and given you marks accordingly; but put everything down on paper.

- (3) Where a sketch or diagram is necessary, and it is not often that some kind of drawing is not needed in practical work, draw it clearly and on a *large scale*. It is a very common fault of candidates to draw the dissected parts of a botanical or anatomical specimen, or the appearance of cells under the microscope, on an

absurdly small scale. The drawing ought, in most cases, to cover nearly a whole page.

- (4) Leave plenty of time for writing out at the end, and, in cases where there is much calculation to be done, leave an excess of time, for you may make a small arithmetic mistake which does not become apparent until you have arrived at the result, and it is then annoying to hear "time" called before you have had a chance of working out your calculations afresh.



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